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Raising an “Amoeba Army” to Fight a Deadly Intestinal Parasite

Senior biology and chemistry major Joshua Leitao investigates amebiasis via American Society of Microbiology research fellowship



September 18, 2015 | Sabrina Polin '17

BRISTOL, R.I. – On a recent Wednesday morning, Joshua Leitao unlocks a laboratory on the ground floor of the Marine and Natural Sciences building, snaps on purple latex gloves, and retrieves a carton labeled, “Joshua’s Amoeba Army.” Selecting a particular amoeba strain, he squirts a pearl-sized dollop onto a slide and places it under the microscope. Once he adjusts the clarity, millions of translucent, golden pods pop into sharp focus. He leans back on the stool and nonchalantly jokes that his “amoeba army will take over the world someday” – but he may not be entirely kidding as his research has the potential to reach all corners of the Earth.

At least, that’s his hope. Via an undergraduate research fellowship granted by the [American Society of Microbiology](#), Leitao, a senior biology and chemistry double major, has been experimenting with amoebas for the past four months to work toward the creation of a new medical treatment for amebiasis, an intestinal infection caused by a parasite that is often deadly in tropical and developing countries.

Thanks to the grant award, Leitao – one of only 33 recipients of the fellowship nationwide – worked alongside Associate Professor of Microbiology Avelina Espinosa this summer to expand his investigation, and will continue the project through the fall and spring semesters.

“I’ve isolated and modified specific enzymes from various *Entamoeba*, to help understand the broader aspect of the disease,” says Leitao, a Bristol, R.I. native. “If we’re able to do that, we’re able to contribute to the management of this deadly human disease.”

Amebiasis, though treatable in healthy individuals, is deadly to those in areas with poor sanitation or that lack access to medical care. The culprit of the disease – the parasite, *Entamoeba histolytica* – infects 50 million people per year and is responsible for 100,000 deaths annually worldwide, making it one of the most common causes of death from parasitic disease, according to the World Health Organization.



As he investigates this disease and other projects, Leitao works nearly every day in the lab – some days devoting 15 hours. Leitao’s dedication to his projects and resourcefulness are standout qualities that likely earned him an ASM research fellowship, according to Espinosa.

“You have to kick Josh out of the lab!” Espinosa says. “He’s reliable, he’s consistent, and when things aren’t working, he tries again. He doesn’t wait for me to tell him what to do.”

Now going into his fourth year as one of Espinosa’s lab researchers, Leitao has contributed to several of her projects, including one in the beginning phases of publication; it involves inhibiting enzymes essential for *Entamoeba histolytica* survival, and ties neatly into his current research. Along the way, he’s worked with a lab partner, Meagan Hackey, and helped train an upcoming generation of undergraduate lab researchers.

As part of his research fellowship, Leitao will showcase his project at the ASM Microbe 2016 conference in Boston in June. His other work has earned him an American Society for Biochemistry and Molecular Biology 2015 Award, the International Society of Protistologists 2014 Award – from which he also collected “Best Presentation About Single Cell Organisms” – and he presented his research at the American Chemical Society National Meeting and Exposition in Denver, Colo. Leitao is also the president of RWU’s ASBMB chapter.

“I’m proud to say I’ve done more than just this one poster or fellowship,” says Leitao, who will also receive a certificate in biotechnology and a minor in public health upon graduation. “I’ve had a comprehensive experience in research.”